

Having the right soil for tomatoes is crucial. Tomatoes are seen to be one of the easiest vegetables to grow, but to grow **WELL** that is the tricky part. First we will start with the soil structure, then move into specific nutrients, then talk about the soil pH. After that we will touch on soil temperature, pruning, tomato pests, tomato types and varieties, the universal disease resistance code, and lastly end with soil maintenance.

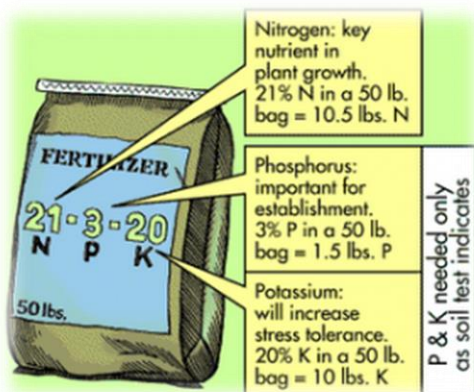
## Soil Structure - Soil should be loose and well-draining. Tomatoes do

not like their soil to be too moist, when soil is not allowed to drain freely you can see many diseases forming from root rot, to clubroot, to fusarium wilt. The soil should have lots of well broken down organic matter, and a soil makeup of around 20% silt, 40% sand, and 40% clay. This will allow for optimal root aeration, water penetration, and overall good root growth.



- Tip: Planting tomatoes in a container or raised bed allows you to regulate the soil composition, and ultimately leading to a healthier tomato.

## Soil Nutrients – The soil is made up of many things from silica, to



carbon. But many gardeners do not realize the importance of looking at their nutrient levels. A simple N-P-K kit can tell you about your soils fertility, and often adding a well-aged manure/compost mixture every spring will do the trick. A tomato needs 3 main nutrients called Macronutrients. These big 3 are N – Nitrogen, P –

Phosphorus, and K – Potassium. But there is also calcium and magnesium that are nearly equally as important that many gardeners skip right over.

- **Nitrogen** is crucial for plant growth and contributes to the overall green color in the leaves and is responsible for making sure the plant is strong, and sturdy. But too much nitrogen will trick the plant into thinking it does not need to produce fruit to reproduce. A sign your plant is lacking Nitrogen is by looking at the leaves. A deficient plant will have yellow leaves in general. If the yellow is concentrated to just the leaf and not the veins (see Potassium pg. 3). A good source of Nitrogen is Blood meal. It is 100% natural and usually OMRI certified organic.
  - Tip: use a nitrogen rich fertilizer early in the spring when first planting, but lean off it during the growing season as it will inhibit the amount of flowers your plant puts out resulting in less tomatoes.



- **Phosphorus** is key for flower set and root health. A tomato grower needs to focus on phosphorus more so than any nutrient, often times we short suit our gardens by giving everything an all-purpose organic fertilizer. This all-purpose fertilizer is good for all plants, but not the key to giving you those monster yields that you would hope for. A tomato lacking phosphorus can be identified easily by a deep purple underside of the leaf, and a stunted main stem. A good phosphorus rich fertilizer can be thought of as a “Bloom-Booster” that many big agricultural firms produce. The issue with this is salt buildup, and synthetic chemicals making your organic garden a bit less organic.



**“Is there an organic substitute?”**

**YES!** Many growers will turn to a form of bone meal. Bone meal is extremely high in phosphorus, and will give you the results you are looking for. Not only that, but it is 100% all natural, and most of the time OMRI certified organic.

- Tip: adding phosphorus during the growing season will tell the plant to start fruiting. Increase the amount you give your plant as the season goes on to increase fruit production. Also, do not forget to feed it a little in the beginning at transplant time as it is crucial for root health as well.

- **Potassium** – key in overall plant health, vigor, and strength. A fast growing plant will be important to getting loads of fruit on before the cold weather comes. Not only that, but it will prevent the leaves from powdery mildew, and viruses such as Septoria leaf spot, Fusarium wilt, late blight, and early blight. A sure sign of knowing that your plant is lacking in potassium is by looking at the leaves. A potassium deficiency is noticed by green veins, and a yellow leaf. The edges may also begin to curl in severe cases.



- **Calcium** – Calcium can be one of the most overlooked soil nutrients there is. Calcium is crucial for the plant cell to have structure. Calcium in combination with high levels of potassium will create a very rigid leaf structure, and therefore protecting it from insects, molds, mildews, and viruses. It also is very important with fruit set. Tomatoes lacking calcium may see numerous problems. One being cracking, when

there is an excess of water cracking will occur because the skin of the



tomato was too thin. The second problem is called Blossom End Rot (BER). When a tomato forms what is called blossom end rot (BER) it can be the cause of a lack of water which renders the plant unable to intake available calcium. OR there is a lack of calcium all together. To eliminate the second factor there are a few tips to fix that.

- Tip: Add crushed eggshells to your garden near the root zone of your plants to allow for a slow release of calcium.

- **Magnesium** - plays an important role in the formation of chlorophyll and in photosynthesis, but roots and fruit are also affected by Magnesium. If a gardener uses nitrogen in combination with magnesium, they will see a very good result since the nitrogen tells the plant to grow, and the magnesium works with the plant to create energy necessary for growth. This will result in more sugars and sweeter fruit. A way to tell if your plant is lacking magnesium is by looking at the leaves. If your plant has leaves that are curling up but bending down, there is a very high chance your plant could use some magnesium. DO NOT let this confuse you with Potassium where the leaves curl up, but don't bend down.



**“My tomatoes are bitter and lacking flavor”**

Then add some magnesium! Magnesium will allow the leaves to produce sugars through increased photosynthesis and result in sweeter fruit.

- Tip: The easiest form of magnesium is Epsom salt. It is all natural and usually OMRI certified organic.

- **Other Nutrients** – Other nutrients are just as important, but can often go unnoticed for several years. The best way to combat this problem is to add a rock dust, or other mineral supplement like kelp meal or seaweed extract. These nutrients play an active role in increasing the microbial life in the soil, as well as maintaining the temperamental balance of life in not only the plant, but in the garden as a whole.

**Soil pH** – The proper pH for your soil should be between 5.5 and 6.0 this is because tomatoes like acidic soil. An improper pH can lead to nutrient deficiencies because even if there is ample nutrients available. This is because the pH has a direct effect on how nutrients can be taken up by the roots. A pH test can be done very simply by purchasing some litmus strips.

**Did you know?**

Old timers would taste their soil to test the pH! If the soil was acidic it was sour to the taste and would have a bite to it. If the soil was alkaline, it would be bitter to the taste, and slightly soapy tasting.



**Soil Temperature** – The temperature of the tomato should be between 55 and 85 degrees for optimal health. The temperature of the soil can be vital in keeping your plant healthy. Any colder and the cool weather will result in a higher chance of soil born diseases. Any hotter and you run the risk of burning roots. The soil temperature also can tell a lot about the activity in the soil. When temperatures are cold, not many beneficial insects and bacteria are active; these are the things that protect the roots from root borne diseases. Nutrients also do not transfer well in colder temperatures; this is simply because molecules move

slower at lower temperatures, so a plant with high nutrient needs will not be able to grow as well as one in warm soil temperatures.

- **Tip:** Maintaining good soil temperature and soil moisture as well is by mulching. Mulch will insulate the soil to keep a heat barrier, as well as protect against evaporation.

**Pruning** – Pruning tomatoes is a VERY important step in ensuring a healthy plant. This will include suckering, branch removal, and bottom clearing.

**Suckering** – When a tomato grows, it produces side branches, and side shoots. The difference between the two is side branches are simply branches that extend from the growing tip, otherwise known as lateral growth. A sucker is a completely new plant that forms from the crotch between a side branch, and the main stem. It can grow to flower and fruit just as the mother plant will.

- **Tip:** to ensure proper air flow, tomatoes should be pruned of all suckers. This not only increases strength to the main stem, but results in larger fruit, and better air circulation.



**Branch removal** – Sometimes a diseased branch will spread throughout the entire plant if left unchecked. A way to slow down the spread of infection is to remove infected branches at the stem.

**NOTE:** removing infected leaves will do nothing, since the virus is in the veins of the branch itself. The whole branch must go.

Another reason to remove branches is to increase air flow. Often times with very healthy plants they will produce many branches. This can cut off air flow

leading to moisture staying on leaves for prolonged periods of time; thus resulting in blights, and mildews.

**Bottom Clearing** – Bottom clearing is the process of taking all the leaves within 1 foot of the soil line. This prevents soil from splashing in the leaves which is the leading cause of blight and other soil borne diseases in plants. It is a preventative measure, and also allows again, for more air flow under the canopy to prevent moisture from staying on leaves.



## **Tomato Pests**



Pest: Tomato Hornworm

cures:

- Pluck of by hand
- Parasitic wasps
- Birds

- Tip: Check undersides of leaves close to the top. Hornworms like tender new leaves. Also - Place a bird feeder next to your tomato plants, a bird's favorite meal is a tomato hornworm.

Symptoms: Loss of foliage, brownish green droppings on leaves below.



## Pest: Aphid

## Cures:

- Spray off with high pressure water
- ladybug larva
- neem oil

- Tip: Check the undersides of leaves since that is where they will colonize.



Symptoms: sticky drops of water called “Honeydew” , downward curling leaves, stunted growth, presents of ants (due to the sugary secretions)



## Pest: Cutworm A.K.A “armyworm”

## Cures:

- Cutworms need a young tender plant, by planting a slightly mature plant, the stem will be hard enough to not be chewed on.
- birds
- 5 to 7 tooth picks around the base of the plant

Symptoms: bite marks near soil level, plant falling over at the base



## Pest: Slug

## Cures:

- crushed egg shells around the base of the plant
- Sluggo™
- spent coffee grounds at the base of the plant
- sand around the base of the plant
- copper strip around the raised bed, or in a cuff around the base of the plant

Symptoms: loss of leaves, bite marks in fruit, slime trails



## Pest: Flea Beetle

## Cures:

- diatomaceous earth (D.E)

## Symptoms:

Gunshot holes in leaves

- Tip: Do not plant near potatoes since potatoes are the major attractant for the flea beetle.

## Tomato Types:

**Indeterminate:** Best for growing in warmer climates. These tomatoes will fruit all year long, and will ripen at random times. They also will grow as tall as the season allows. These offer generally better yield, if the time allows.

**Determinate:** This tomato is perfect for anyone growing in containers as they have a set height limit. With the set height limit also comes a limited fruit output. The benefits though with a determinate is that all the tomatoes re ripe at almost the same time, and they generally are faster to ripen.

## Tomato Varieties:

**Cherry** – This tomato is small, has a juicy inside, and ripens very quickly. For northern growers, this tomato suits them best since the plants come in both determinate and indeterminant, it offers a wide selection for your growing style.



**Grape** – The closest relative is the cherry tomato, the grape tomato is smaller than a plum tomato, but very similar in shape. They are slightly juicier and faster to ripen. They can come in both determinate and indeterminate varieties.



**Plum/Paste** – Plum tomatoes are small/medium oval or oblong shaped, and often are juicy on the inside. They are often seen as the icon of the tomatoe since they can be used for pretty much anything from salads to pasta sauce. They ripen quickly, and come in both determinate and indeterminate varieties.



**Slicer** – Slicer tomatoes are medium/large tomatoes, usually always spherical in shape, and have a juicy inside. The seeds are a bit larger than most tomatoes. They ripen rather late in the season not making it optimal for northern growers, but still possible. They come in a determinate and an indeterminate variety.



**Beefsteak** – The largest of all the tomatoes. Almost always over 1lb. and come in several shapes. The tomato gets its name from the marbling inside the tomato when cut much like steak. Excellent in tomato paste and spaghetti sauce due to their lack of juice and seeds, and perfect for burgers. They are the longest to ripen making them easier for southern gardeners, but easily the most entertaining to grow. They come in both determinate and indeterminate varieties.



## Disease Resistance Codes:

When purchasing seeds or plants, there are some varieties that are more disease resistant than others, and the seed companies and greenhouses want you to know about them, so here are the universal codes for tomatoes:

H = Hybrid

OP = Open Pollinated

V = Verticillium Wilt

VFN = Verticillium Wilt, fusarium wilt, Nematode

F=Fusarium Wilt

FF =Fusarium, races 1 and 2

FFF= Fusarium, races 1, 2, and 3

N =Nematodes

A= Alternaria blight

T= Tobacco Mosaic Virus

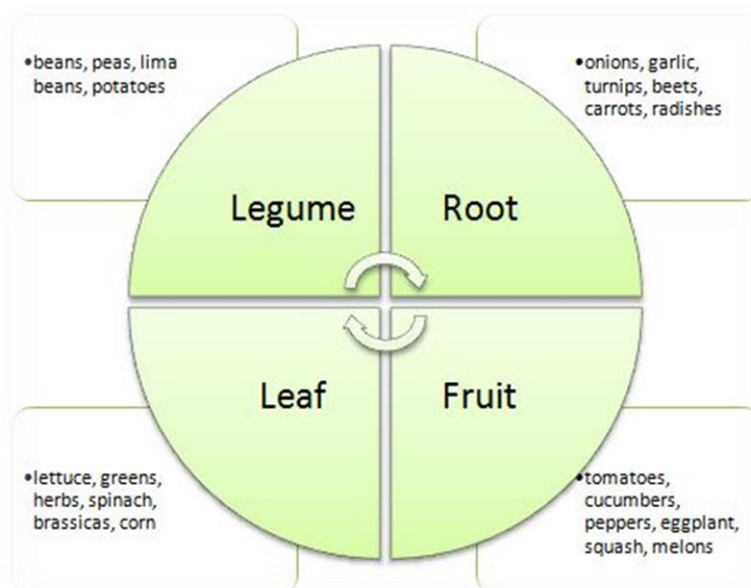
TSWV =Tomato Spotted Wilt Virus



**Soil Maintenance** – Growing tomatoes is fun, and once you have mastered the art of growing them, there are just a few more things to do to ensure future success. This includes crop rotation, and soil conditioning.

**Crop Rotation** - Crop rotation is the practice of growing a series of dissimilar/different types of crops in the same area in sequential seasons. Crop rotation gives various benefits to the soil. Crop rotation can prevent the build-up of pathogens and pests that often occur when one species is continuously grown, this can also improve soil structure and fertility by alternating deep-rooted and shallow-rooted plants.

Tomatoes being one of the more disease tolerant varieties, it is smart to change growing locations from year to year.



- Tip: Do not plant potatoes, eggplant, or peppers where you last planted tomatoes and vice versa, since tomatoes, peppers, potatoes, and eggplant are all members of the solanaceae (nightshade) family.

**Soil conditioning** – The action of adding a product to the soil improving the soil's physical qualities, especially its ability to provide nutrition for future plants, increasing fertility, water holding capabilities, and overall tilth or looseness.

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